

Semantic satiation and problem solving^{1, 2}

ALBERT H. WAKIN AND JOHN R. BRAUN

UNIVERSITY OF BRIDGEPORT

Experimental Ss had 30 sec. of satiation treatment with a relevant word (swing) prior to attempting the Maier two-string problem. Control Ss had either no satiation treatment or satiation of an irrelevant word (smell). Solution times on the Maier problem were significantly longer for experimental than for control Ss.

"Semantic satiation is the loss of a word's meaning which comes about through its continued repetition or prolonged inspection" (Amster, 1964, p. 273).

The effects of satiation training have been studied in a variety of contexts: word association (Smith & Raygor, 1956), Semantic Differential ratings (Lambert & Jakobovits, 1960), addition tasks (Jakobovits & Lambert, 1962a), concept formation (Jakobovits, 1965), and the Russel and Storms paradigm (Jakobovits & Lambert, 1962b). The present investigation deals with satiation in relation to problem solving. It was hypothesized that satiating a word relevant in the solution of a problem would result in inhibiting problem solving.

Maier's two-string problem (Maier, 1933) was utilized in the present study. This problem is one in which S is required to tie the free ends of two ropes hanging from the ceiling. The distance between the ropes is such that if S holds one, it is impossible to reach the other. The solution is to tie a heavy object (such as a pair of pliers) to one of the ropes and swing it as a pendulum. Holding the stationary rope with one hand, and, with the other, catching the swinging rope as it approaches is considered the "correct" solution.

Judson, Cofer, & Gelfand (1956) showed that performance on this problem could be facilitated by increasing the availability of relevant mediators. Prior to being introduced to the problem, Ss were given pretraining on a task involving learning lists of words in serial order. For one group the words rope, swing, and pendulum were inserted into one list. Other groups did not learn these words in the same order. The group which had the response system "rope, swing, pendulum" established, did better on the two string problem.

Using the paradigm of Russell & Storms (1955), Jakobovits & Lambert (1962b) showed that satiation training could decrease the availability of relevant mediators. The paradigm involved chains of word associations (B-C-D) constructed from normative data on association frequencies. Ss first learned an A-B list where the A terms were nonsense syllables and the B terms were the initial members of the chains. The test situation involved the learning of lists of A-D and A-X pairs where D terms were the final members of the associative word chains and X terms were not associated with any of the chains. Russell and Storms found that the

A-D pairs were learned significantly faster than the A-X pairs and concluded that these effects were mediated by implicit verbal chains of more than one link.

In the Jakobovits and Lambert study the same basic procedure was followed except that for one of the groups the meaning of the inferred mediator, C (B-C-D), was reduced by a satiation procedure, resulting in less facilitation of learning of the A-D list. The authors viewed their findings as support for the interpretation of semantic satiation as a cognitive form of reactive inhibition having characteristics similar to the extinction phenomenon noted with conditioned responses.

The present study combined aspects of the Judson, Cofer, and Gelfand and Jakobovits and Lambert designs. As in the Judson, Cofer, and Gelfand study, Ss learned the sequence "rope, swing, pendulum" prior to performance on the two string problem. Then, however, for one of the groups, a relevant mediator (the word "swing") was satiated, similar to the procedure employed by Jakobovits and Lambert. The Maier two-string problem was presented, testing the hypothesis that satiating a word relevant to the solution of the problem would result in inhibiting problem solving.

Method

Ss were students in introductory psychology sections. During regular class time, Ss were asked to rate a list of 15 words on five seven-point scales of the Semantic Differential which were chosen on the basis of previous studies. Included in this list were the words "smell" and "swing."

Several days later, Ss individually reported to the pre-training situation. Here Ss in all three groups learned a list of five three-word chains to the criterion of one errorless trial. One of these chains was "rope, swing, pendulum." Immediately after this pretraining, Group II Ss received 30 sec. of satiation treatment with the word "smell," and Group III Ss with the word "swing." Instructions were: "You will be shown a word. Please concentrate and stare at the word repeating it over and over again out loud." Group I Ss received no satiation treatment. Ss in all three groups were then taken to another room and tested with the two-string problem. E observed the Ss through a one-way mirror and recorded the length of time taken to solve the problem. Five min. was recorded for Ss unable to solve the problem within this maximum time limit. Finally, Ss were asked to rate the 15 words on the Semantic Differential again. There were 15 Ss in each group.

Results and Discussion

An analysis of variance on the number of trials required for one errorless trial when learning the pretraining word chains yielded an $F = .17$, demon-

strating no significant difference among the three groups initially.

Means for time taken to solve the two-string problem were 2.31, 2.01, and 4.17 min. for Groups I, (no satiation), II ("smell" satiation), and III ("swing" satiation), respectively. Standard deviations were 1.24, 1.36, and 1.16, respectively.

An analysis of variance yielded an $F=12.17$, $df=2/42$, $p < .001$. Results of t tests demonstrated that the Group III mean solution time was significantly longer than that for Groups I and II ($p < .01$), and that Groups I and II did not differ significantly.

An additional finding was that two Group I and two Group II Ss were unable to solve the two-string problem within the 5 min. limit. However, in Group III, eight Ss could not solve it. Thus, with the relevant mediator satiated, eight out of 15 Ss were unsuccessful on the problem, as opposed to only four out of 30 when the mediator was not satiated.

A polarity difference score, used as an index of semantic satiation, was computed for pre- and post-satiation ratings for the words "smell" and "swing," as well as for the other 13 words which had been rated. There was a trend toward neutrality of rating (loss of meaning) in the post-satiation ratings for both satiated words. However, this trend was significant only for the word "smell" ($t=2.7$, $p < .01$). Upon further analysis, it was found that the mean pre-satiation rating for the word "smell" was significantly higher than the pre-satiation rating for the word "swing" ($t=3.5$, $p < .01$). In other words, the word "smell" was originally farther removed from the neutral point that was the word "swing." It was suggested that it was this initial degree of neutrality which resulted in the lack of significant difference between the pre- and post-satiation ratings of "swing." No significant differences

between the pretest and retest ratings for the other 13 words were found. These other words had, of course, received no satiation treatment.

It is concluded that satiation of a relevant mediator had significant inhibitory effects on the solution of the Maier two-string problem. The fact that the effects of satiation experience with the word "swing" were significant when measured by problem solving performance but not by Semantic Differential ratings, points up the importance of using multiple response measures.

References

- Amster, Harriet. Semantic satiation and generation: Learning? Adaptation? *Psychol. Bull.*, 1964, 62, 273-286.
- Jakobovits, L. Semantic satiation in concept formation. *Psychol. Rep.*, 1965, 17, 113-114.
- Jakobovits, L., & Lambert, W. E. Semantic satiation in an addition task. *Canad. J. Psychol.*, 1962, 16, 112-119.
- Jakobovits, L., & Lambert, W. E. Mediated satiation in verbal transfer. *J. exp. Psychol.*, 1962, 64, 246-252.
- Judson, A. J., Cofer, C. N., & Gelfand, S. Reasoning as an associative process: "Direction" in problem solving as a function of prior reinforcement of relevant responses. *Psychol. Rev.*, 1956, 2, 501-507.
- Lambert, W. E. Verbal satiation and changes in intensity of meaning. *J. exp. Psychol.*, 1960, 60, 376-383.
- Maier, N. R. F. Reasoning in humans. *J. comp. Psychol.*, 1930, 10, 115-144.
- Russell, W. A., & Storms, L. H. Implicit verbal chaining in paired-associate learning. *J. exp. Psychol.*, 1955, 49, 287-293.
- Smith, D. E. P., & Raygor, A. L. Verbal satiation and personality. *J. abnorm. soc. Psychol.*, 1956, 52, 323-326.

Notes

1. This report is based on a thesis submitted by the senior author in partial fulfillment of requirements for the master's degree at the University of Bridgeport. The junior author was thesis director.
2. A report of the study was presented at the 1966 meeting of the Eastern Psychological Association in New York.